

## THE MAYFLIES (EPHEMEROPTERA) OF CONNECTICUT: AN INITIAL FAUNAL SURVEY<sup>1</sup>

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**ABSTRACT:** Mayflies from 80 sites across Connecticut were studied. A list of 109 species, including 34 new State records, was compiled. Two-way Indicator Species Analysis (TSA) was used to investigate block structure in the overall species data matrix. Site classes produced at successive division levels in repeated TSA runs showed no discernible stable geographic trends. Similarities among sites within a class and variation between classes resulted from differences in attributes of aquatic habitat structure that are not constrained within the context of ecoregions/subregions proposed for Connecticut.

Within New England, Connecticut represents a comparatively small area (13,183.1 km<sup>2</sup>), but has the potential for a diverse mayfly fauna. Southernmost of the New England States and located directly east of the Hudson River drainage, Connecticut has a range of climate and habitat types typical of areas much further north and south. Recently, Griffith *et al.* (1993) recognized two broad ecoregions and several subregions in Connecticut (Fig. 1). Throughout these zones aquatic habitats suitable for mayflies are common. Lotic habitats range from large deep rivers to first order streams and spring brooks. Lentic habitats vary from large lakes to small glacially formed ponds and temporary flood plain pools.

Connecticut mayfly populations are routinely sampled by environmental agencies for purposes of monitoring water quality. However, these groups have made little effort to identify species and currently there is no species list available. Further, little is known about the distribution of species with regards to landscape patterns. Some site specific data are available from the Connecticut Department of Environmental Protection, but are biased toward lotic habitats with coarse, poorly sorted substrates. This study is the first attempt to catalog the occurrence of mayfly species in Connecticut and to analyze species assemblages. Species recorded in this study will be entered into a GIS dBase that will be developed into a computerized atlas for mayflies of New England and Atlantic Canada.

### HISTORICAL OVERVIEW

The earliest list of mayflies from Connecticut appears in Britton's (1920)

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checklist of Connecticut insects. The study of his material deposited at the Connecticut Agricultural Experiment Station showed that many of the specimens were female imagos, subimagos, or badly damaged and could not be determined to species. Specimens labeled as *Siphonurus aridus* Say, *S. typicus* Eaton, and *Heptagenia luridipennis* Burmeister were either females or badly damaged male imagos and could only be determined to *Siphonurus* sp. The specimen labeled *Heptagenia terminata* Walsh was damaged and tentatively determined to be *Stenonema* sp. No specimens were located that corresponded to Britton's records for *Hexagenia bilineata* (Say), *Ephemerella cornuta* Morgan and *Siphonurus mirus* Eaton. Two specimens labeled *Ephemera varia* Eaton were tentatively confirmed to be correct. Among the material labeled *Hexagenia limbata* Serville, *Leptophlebia cupida* (Say), and *Callibaetis ferrugineus* (Walsh) were enough intact specimens to verify these determinations.

Traver (1935) only listed records for three species: *Drunella cornuta* (Morgan) [as *Ephemerella cornuta* Morgan], *Siphonurus quebecensis* (Provancher), and *S. typicus* Eaton [as *S. bernice* McDunnough]. Burks (1953) expanded the list to include *Arthroplea bipunctata* McDunnough, *Leucrocuta hebe* (McDunnough) [as *Heptagenia hebe* McDunnough], *Stenacron interpunctatum* (Say) [as *Stenonema canadense* (Walker)], *Stenonema modestum* (Banks) [as *Stenonema rubrum* (McDunnough)], *Leptophlebia johnsoni* McDunnough, *Ephemera varia* Eaton, *Ephemerella dorothea* Needham, and *Siphonurus rapidus* McDunnough. The record of *E. varia* is problematic, because Burks (1953) only listed the State with no site location and no other valid records of the species were found.

Studies by Allen and Edmunds (1962) on the genus *Drunella* added the record of *D. walkeri* (Eaton) to the list of Connecticut taxa.

McCafferty (1975) listed spot map records for *Ephemera simulans* Walker and *Hexagenia limbata* Serville [as *H. munda* Eaton]. Bednarik and McCafferty (1979) studied the Nearctic species of *Stenonema* and added *S. mediopunctatum* (McDunnough) and *S. vicarium* (Walker) to the list of Connecticut species. Kondratieff and Voshell (1984) studied the Nearctic *Isonychia* and listed Connecticut records for *I. bicolor* (Walker). Most recently Provonsha (1990) published records for *Caenis amica* Hagen, *C. latipennis* Banks, and *C. punctata* McDunnough.

In addition to these published accounts, there are other sources of records in the "gray literature" that should be mentioned. The first is a masters thesis by Dodds (1978) on the mayfly fauna of the Fenton and Natchaug Rivers in eastern Connecticut. Dodds' thesis contains records for about 47 species. Dodds reared many species and amassed series of nymphs used to study nymphal growth and development. Our study of Dodds' material revealed that specimens determined as *Isonychia sadleri* Traver and *Isonychia thalia* Traver were really *Isonychia bicolor*. Study of series of specimens labeled *Rhithro-*

*gena amica* Traver and *R. anomala* McDunnough showed a third species that was previously not recorded by Dodds: *Rhithrogena jejuna* Eaton. Species listed by Dodds that we could not verify were not included in our taxa list.

The second source of "gray literature" records is a U.S.E.P.A. report by Bilger (1986) on the aquatic macroinvertebrates of New England and New York. Sixty-two taxa of mayflies were listed by Bilger as occurring in Connecticut. These records were based almost entirely on information supplied from the Connecticut Dept. of Environmental Protection (Water Compliance Sec.). Species included in Bilger's list that we could not verify were not included in our species list.

## MATERIALS AND METHODS

Mayfly nymphs and adults from 80 sites distributed across Connecticut were studied. Sites were plotted by latitude/longitude coordinates on a base map of Connecticut formatted to be digitized as a GIS geographic file (Fig. 1). Four control point coordinate pairs are given on the base map for corners of the State and a central location at the intersection of Hartford, Middlesex, and New Haven Counties. Sites for which latitude/longitude coordinates were not previously known were estimated from a 1:250000 scale U.S.G.S. base map of Connecticut. Sites are labeled on the base map (Fig. 1). by county site codes. These codes are listed with site locations, site coordinates, and TWINSPAN code numbers in Appendix 1.

The detection of stable geographic patterns is a primary goal of most studies of species distribution. A method well suited to revealing such patterns or block structures in a divisive polythetic manner is Two-way Indicator Species Analysis (TSA) (Gauch 1982) via the computer program TWINSPAN (Hill 1979). Blocks of sites (i.e., site classes) are defined by TSA by groups of differential species with a similar distribution across all sites in a group. Block structures elucidated by TSA may correspond to a group of uncommon taxa/communities or common widely distributed taxa/communities that have a common distribution among a restricted number of sites (Brown *et al.* 1993). TSA uses no geographic data in finding block structures; thus all such structures result from biological or ecological attributes of species.

Connecticut mayfly species distribution data were compiled into a full format binary matrix (where 1 is a positive occurrence and 0 a negative occurrence) of 80 columns (sites) by 108 rows (species). The species *E. varia* was omitted because of its problematic nature as discussed earlier. Repeated TWINSPAN analyses were completed emphasizing and deemphasizing rare taxa and to look for problems of convergence as described by Furse *et al.* (1984).

Specimens studied to produce the full species matrix were obtained from

the following sources: Amer. Mus. of Nat. Hist. (AMNH), Univ. of Conn. (at Storrs) Insect Col. (UCONN), Conn. Agricul. Exper. Sta. New Haven (CAES), Conn. Depart. of Environ. Protect. (Water Compliance Section) (CDEP), Peabody Museum, Yale Univ. (PMYU), and new material obtained by both authors. Voucher specimens, except where noted, were deposited in the insect collection of the Peabody Museum, Yale University.

## RESULTS AND DISCUSSION

Species of mayflies recorded in this study are presented in Table 1. Arrangement of taxa is according to the classification of McCafferty (1991). New state records are indicated by (+); species recorded in the literature, but not collected or reexamined during this study by (+); and tentative species determinations by (?). Species distributions are given by county site codes defined in Appendix 1. After repeated TWINSpan analyses no clear stable geographic patterns were observed. Blocks of sites (i.e., classes) overlaid on ecoregions/subregions of Connecticut showed no correlation to broad landscape units. However, site classes (Appendix 1) did more or less correspond to macroecological divisions within aquatic habitats (e.g., shallow riffles, transitional runs, pools, and flood plain pools). Because structurally similar aquatic habitats suitable for mayflies are widely distributed in Connecticut, most species seem to be equally widespread with a high probability of occurring where habitat and climate are within ecological tolerances for a species. Exceptions to this trend seem to be most parsimoniously explained by comparing attributes of species ranges in eastern North America with the occurrences in Connecticut. For example, *Cinygmula subaequalis*, *Leptophlebia bradleyi*, and *Paraleptophlebia assimilis* had restricted occurrences in Connecticut. *Cinygmula subaequalis* has only been recorded from a cool stream in the northwestern corner of the state where hills contiguous with the Appalachians occur. In eastern North America this species is restricted to cool fast flowing streams of the Appalachian Mountains and associated foot hills. The occurrence of this species in northwestern Connecticut is consistent with its known continental distribution and habitat requirements.

In the case of *Leptophlebia bradleyi* and *Paraleptophlebia assimilis*, these species are mostly southeastern components of the Piedmont and Coastal Plain communities. In Connecticut they have only been found in the south-central region, which has the highest annual temperatures and most accumulated heat. Currently, this area represents the northeastern limits of these species ranges. Considering the southeastern nature of these species, their occurrence in this part of Connecticut is consistent with attributes of their distribution in eastern North America.



Table 1. Species list of Connecticut mayflies. Species distributions are given by county site codes defined in Appendix 1.

Species List	Species Distribution
Suborder Pisciforma	
Infraorder Imprimata	
Family Ameletidae	
<i>Ameletus ludens</i> Needham	LD1
Family Siphonuridae	
<i>Siphonurus alternatus</i> (Say)	TD2
<sup>†</sup> <i>S. mirus</i> Eaton	MX2
<i>S. quebecensis</i> (Provancher)	MX2, NH2, NH6
<i>S. rapidus</i> McDunnough	FD6, MX2, NH6, NH9
<sup>†</sup> <i>S. securifer</i> McDunnough	MX2, NH6, NH9
<sup>†</sup> <i>S. typicus</i> Eaton	LD17 <sup>††</sup>
Family Baetidae	
<i>Acentrella ampla</i> Traver	FD1, LD1, MX4, MX5, NH13, NH22, TD2
<i>A. carolina</i> (Banks)	MX1, NH2, TD4
<sup>†</sup> <i>Acerpenna macdunnoughi</i> (Ide)	HD6
<sup>†</sup> <i>A. pygmaea</i> (Hagen)	MX1, MX6
<i>Baetis armillatus</i> McCafferty & Waltz	NH1, NH20
<sup>†</sup> <i>B. brunneicolor</i> McDunnough	HD3, LD4, LD18, NH2, NH1, NH16, NH17, TD4
<i>B. dubius</i> (Walsh)	LD1, LD5, LD7, NL4, NL8
<i>B. flavistriga</i> McDunnough	LD4, LD8, LD10, LD18, MX2, MX3, NH6, TD2, TD4
<i>B. punctiventris</i> (McDunnough)	FD2, HD3, HD4, LD11, LD14, MX7
Family Baetidae	
<i>B. tricaudatus</i> Dodds	HD3, HD4, HDMX1, NH12
<i>Callibaetis ferrugineus</i> (Walsh)	NH1, NH2, NH4, NH9, NH14, NH15, NH23
<sup>†</sup> <i>C. fluctuans</i> (Walsh)	NL2
<sup>†</sup> <i>C. pallidus</i> Banks	NH1, NH2,
<i>C. pretiosus</i> Banks	NH1
<sup>†</sup> <i>Centroptilum triangulifer</i> (McDunnough)	TD4
<i>C. sp.</i>	TD4
<sup>†</sup> <i>Cloeon cognatum</i> Stephens	FD1, NH14, NH15, NH23
<i>Heterocloeon curiosum</i> (McDunnough)	LD6, TD2
<sup>†</sup> <i>Procloeon bellum</i> (McDunnough)	NL3, NL6, TD4
<i>P. sp.</i>	NH2
Infraorder Arenata	
Family Metretopodidae	
<i>Siphloplecton basale</i> (Walker)	MX6, NH1
Suborder Setisura	
Family Isonychiidae	
<i>Isonychia bicolor</i> (Walker)	FD1, LD4, LD10, LD18, MX1, NH1, NH20, TD2
<sup>†</sup> <i>I. obscura</i> Traver	NH2, NL3, NL6, TD4
<i>I. sp.</i>	TD4
Family Heptageniidae	
<i>Arthroplea bipunctata</i> McDunnough	LD6, MX2, NH6, NH9, TD2
<i>Cinygmula subaequalis</i> (Banks)	LD14 <sup>†††</sup>
<sup>†</sup> <i>Epeorus fragilis</i> (Morgan)	LD8
<sup>†</sup> <i>E. pleuralis</i> (Banks)	LD3, LD4, MX1, MX2, NH1, TD2
<sup>†</sup> <i>E. vitreus</i> (Walker)	LD1, LD18, NH1, NL1, NL4, TD2
	TD4



Species List	Species Distribution
Family Heptageniidae (continued)	
<sup>1</sup> <i>Heptagenia pulla</i> (Clemens)	LD4, LD18
<i>H. marginalis</i> Banks	TD2 <sup>+++</sup>
<i>Leucrocota hebe</i> (McDunnough)	NL3, NL6, TD2
<sup>1</sup> <i>L. maculipennis</i> (Walsh)	NL3, NL6, WM1
<sup>1</sup> <i>Nixe lucidipennis</i> (Clemens)	LD1, TD2, TD4
<i>Rhithrogena amica</i> Traver	TD2, WM2
<i>R. anomala</i> McDunnough	WM2
<sup>1</sup> <i>R. jejuna</i> Eaton	TD2, TD4
<i>Stenacron interpunctatum</i> (Say)	LD1, LD8, LD10, MX3, TD2, TD5
<i>Stenonema femoratum</i> (Say)	LDL4
<i>S. ithaca</i> (Clemens & Leonard)	TD2, TD4
<i>S. mediopunctatum</i> (McDunnough)	FD2, FD3, FD4, HD3, LD1, LD12, NH4, NH16
<i>S. mexicanum integrum</i> (McDunnough)	HD4, LD9, LD12, LD13, MX7, MX8, NH5
<i>S. modestum</i> (Banks)	FD1, HD1, LD3, LD10, MX3, MX10, NH1, NH2, NH3, NH9, NL4, NL7, NL8, TD2, TD5
<i>S. pudicum</i> (Hagen)	LD13, LD14, MX1, MX9, MX12
<i>S. vicarium</i> (Walker)	FD1, LD7, MX1, MX9, MX12, NH1, NH2, TD1, TD
Suborder Rectracheata	
Infraorder Lanceolata	
Family Leptophlebiidae	
<sup>1</sup> <i>Choroterpes basalis</i> (Banks)	FD1 <sup>####</sup>
<i>Habrophlebia vibrans</i> Needham	NH4, TD2
<sup>1</sup> <i>Habrophlebiodes americana</i> (Banks)	TD2, TD4
<sup>1</sup> <i>Leptophlebia bradleyi</i> Needham	MX10, NH21
<i>L. cupida</i> (Say)	FD1, LD15, MX2, MX10, NH1, NH4, NH6, NH9, NH13, NH22, NH23
<i>L. intermedia</i> (Traver)	FD1, NH6, NH9, NH21, NH23
<i>L. johnsoni</i> McDunnough	MX2, MX11, NH6, NH9, NH23
<i>Paraleptophlebia adoptiva</i> (McDunnough)	LD9, MX1, MX7, MX9, NH4, NL3, TD1, TD2, TD3
<sup>1</sup> <i>P. assimilis</i> (Banks)	MX12
<i>P. debilis</i> (Walker)	LD9, NH16, WM4
<sup>1</sup> <i>P. moerens</i> (McDunnough)	FD1, FD2
<i>P. mollis</i> (Eaton)	LD1, NL1, NL3, TD2, TD4
<sup>?</sup> <i>P. ontario</i> (McDunnough)	LD14 <sup>+++</sup>
<i>P. strigula</i> (McDunnough)	NL3, NL6
<sup>1</sup> <i>P. volitans</i> (McDunnough)	TD4
Family Potamanthidae	
<sup>1</sup> <i>Anthopotamus distinctus</i> (Traver)	LD10, NL1, NL3, NL6, TD2, WM2
Family Polymitarcyidae	
<i>Ephoron leukon</i> Williamson	LD10
Family Ephemeridae	
<i>Ephemera guttulata</i> Pictet	WM2
<i>E. simulans</i> Walker	LD9, LD10, LD12, NH1, NH23, WM1
<sup>?</sup> <i>E. varia</i> Eaton	<sup>+++++</sup>
<i>Hexagenia atrocaudata</i> McDunnough	LD16, NH2
<i>H. limbata</i> Serville	NH2, NH23
<sup>1</sup> <i>Litobrancha recurvata</i> (Morgan)	LD20

Species List	Species Distribution
<b>Infraorder Pannota</b>	
<b>Family Ephemerellidae</b>	
<i>Attenella attenuata</i> (McDunnough)	NH2, NL3, NL6, TD2, TD4
<sup>†</sup> <i>A. margarita</i> (Needham)	NH5, TD2
<i>Dannella simplex</i> (McDunnough)	FD1, FD2, FD3, HD3, HD4, HD5, LD14, NH1, NH20, TD2, TD4, WD1, WM3, WM4
<i>Drunella cornuta</i> (Morgan)	LD1, LD2, LD3, LD14, NH4, NH8, NL4, NL8, TD2
<i>D. lata</i> (Morgan)	NL3, NL6, TD2, TD4
<i>D. tuberculata</i> (Morgan)	WM2 <sup>†††</sup>
<i>D. walkeri</i> (Eaton)	FD1, HD1, LD1, LD2, MX1, MX12 NL1
<i>Ephemerella dorothea</i> Needham	MX4, NH1, NH4, NH7, NH20, NL1, NL3, TD2, TD4
<i>E. invaria</i> (Walker)	LD3, MX4, NH1, NL1
<i>E. needhami</i> McDunnough	LD10, TD2, WM2
<i>E. rotunda</i> Morgan	HD1, LD1, LD4, LD5, LD18, MX4, MX6, NH1, NH2, NH6, NH12, NH20
<i>E. septentrionalis</i> McDunnough	HD1, LD1, TD2
<sup>?</sup> <i>E. simila</i> Allen & Edmunds	TD2 <sup>†††</sup>
<i>E. subvaria</i> McDunnough	MX1, MX9, NH1, NH2, NH6
<i>Eurylophella funeralis</i> (McDunnough)	NH3, NH4, NH5
<i>E. lutulenta</i> (Clemens)	FD4, LD9
<i>E. minimella</i> (McDunnough)	FD1, FD4, LD11, LD13, LD19, MX8, TD3
<i>E. prudentialis</i> (McDunnough)	MX2, NH9, TD2
<i>E. temporalis</i> (McDunnough)	FD4, FD5, HD4, LD1, WM1
<i>E. versimilis</i> (McDunnough)	HD1, TD2, TD4
<i>Serratella deficiens</i> (Morgan)	LD6, TD2, TD4
<sup>?</sup> <i>S. frisoni</i> (McDunnough)	FD2 <sup>†††</sup>
<sup>†</sup> <i>S. serrata</i> (Morgan)	NH2
<sup>†</sup> <i>S. serratoides</i> (McDunnough)	LD4, LD11, LN18, NL3, NL6
<sup>†</sup> <i>S. sordida</i> (McDunnough)	LD4, LD10, LD18
<b>Family Tricorythidae</b>	
<i>Tricorythodes</i> sp.	NH2, TD2, WM2
<b>Family Caenidae</b>	
<sup>†</sup> <i>Brachycercus nitidus</i> (Traver)	TD2 <sup>†††</sup> , WM2 <sup>†††</sup>
<i>Caenis amica</i> Hagen	LD10, MX2, MX10, NH2, NH10
<sup>†</sup> <i>C. anceps</i> Traver	LD10
<sup>†</sup> <i>C. hilaris</i> (Say)	NH2
<i>C. latipennis</i> Banks	NH2, NH10
<sup>†</sup> <i>C. macafferti</i> Provonsha	LD10
<i>C. punctata</i> McDunnough	NH2, NH10
<b>Family Baetiscidae</b>	
<i>Baetisca laurentina</i> McDunnough	HD1, HD5

<sup>††</sup> - Location listed by Traver (1935) for a specimen collected by C.P. Alexander.

<sup>†††</sup> - Specimens located in the CDEP reference collection.

<sup>††††</sup> - Specimens located in the UCONN collection.

<sup>†††††</sup> - Specimens located in the pinned collection of the AMNH

<sup>††††††</sup> - Specimens located in the pinned collection of the CAES.



Appendix 1. Site locations and codes for Connecticut mayfly data matrix. Latitude/Longitude coordinates are given in Degrees (dd) - Minutes (mm) - Seconds (ss) in the sequence of North dd mm ss / West dd mm ss. Site classes are TSA blocks of sites produced at six division levels.

County	Site Code	Location	Lat./Long. Coordinates	TSA Site Class
Fairfield	FD1	Saugatuck River, North Redding	41 18 00/73 24 00	8
	FD2	Saugatuck River, Redding	41 17 00/73 23 43	5
	FD3	Five Mile River, New Canaan, CDEP site 42	41 08 53/73 29 04	5
	FD4	Norwalk River, Ridgefield at inter. of Rt. 7 & Rt. 102, CDEP site 40	41 16 03/73 26 30	3
	FDS	Still River, Brookfield, CDEP site 02	41 26 19/73 24 05	4
Hartford	FD6	Stamford	41 03 00/73 33 00	8
	HD1	Salmon Brook, Granby	41 57 00/72 46 00	7
	HD3	Eight Mile River, Southington, CDEP site S-9	41 35 16/72 53 52	5
	HD4	Farmington River, Unionville, CDEP site 52	41 45 01/72 52 17	4
	LD5	Farmington River, Avon, CDEP site 53	41 46 18/72 49 18	5
Hartford/ Middlesex	HD6	Mill Brook, Windsor	41 52 00/72 39 00	1
	HDMX1	Mattabessett River, Berlin/Cromwell line	41 37 07/72 42 41	5
Litchfield	LD1	Leadmine Brook, Thomaston	41 41 00/73 05 00	7
	LD2	Naugatuck River, Torrington	41 48 00/73 07 00	7
	LD3	Cranberry Meadow River, Flanders	41 45 00/73 26 00	7
	LD4	Kent Falls Brook, Kent	41 46 00/73 25 00	7
	LD5	Housatonic River, Litchfield (?)	††	7
	LD6	Housatonic River, West Cornwall	41 54 00/73 21 00	7
	LD7	Housatonic River, Cornwall	41 50 00/73 22 00	7
	LD8	Housatonic River, Cornwall Bridge	41 49 00/73 22 00	6
	LD9	Still River, Colebrook (Riverton), CDEP site 54	41 58 02/73 01 59	3
	LD10	Housatonic River, Housatonic Meadows State Park, Sharon	41 51 00/73 22 00	6
	LD11	Shepaug River, Roxbury, CDEP site 25	41 32 55/73 19 51	2
	LC12	Blackberry River, North Canaan (Canaan), CDEP site 37	42 01 24/73 20 28	3
	LD13	Pomperaug River, Woodbury, CDEP site 55	41 32 26/73 12 50	2
	LD14	Salisbury	41 59 00/73 25 00	4
	LD15	Morris	41 41 00/73 12 00	8

County	Site Code	Location	Lat./Long. Coordinates	TSA Site Class
Litchfield (cont.)	LD16	Washington	41 38 00/73 18 00	7
	LD17	Kent Falls, Waren	41 46 00/73 22 00	10
	LD18	Macedonia Brook, Kent	41 45 00/73 29 00	7
	LD19	Still River, Winchester, CDEF site 39	41 57 20/73 02 51	2
	LD20	Loon Brook below Philip's Pond, Colebrook	42 00 00/73 07 00	11
Middlesex	MX1	Eight Mile River, East Haddam	41 26 00/72 20 00	7
	MX2	Hammonasset River, Killingworth	41 24 00/72 37 00	8
	MX3	Seven Falls State Park, Higganum	41 29 00/72 33 00	6
	MX4	Succor Brook, Haddam	41 26 00/72 34 00	7
	MX5	Moodus River, Moodus	41 30 00/72 27 00	8
	MX6	Menunketesuck River, Clinton	41-19 00/72 31 00	7
	MX7	Salmon River, East Hampton, CDEP site 17	41 33 05/72 27 04	7
	MX8	Coginchaug River, Middletown, CEDP site 51	41 33 18/72 40 26	2
	MX9	Strong Brook, East Haddam	41 27 00/72 28 00	7
	MX10	Tetram's Pond, Killingworth	41 26 00/72 37 00	8
	MX11	Grounds Pool, Hammonasset Rod & Gun Club, Killingworth	41 26 00/72 37 00	8
	MX12	Burnham Brook Preserve, East Haddam	41 29 00/72 20 00	7
New Haven	NH1	Branford River, Branford	41 17 00/72 48 00	7
	NH2	Mill River, Hamden	41 24 00/72 53 00	7
	NH3	Cheshire	41 29 00/72 54 00	8
	NH4	Bethany	41 24 00/73 00 00	7
	NH5	Small stream at Kettleton State Park, Southbury	41 25 00/73 12 00	3
	NH6	Hammonasset River, Madison	41 20 00/72 36 00	8
	NH7	Trout Brook, Stratville	41 28 00/73 02 00	6
	NH8	Woodbridge	41 21 00/73 01 00	7
	NH9	Hammonasset Swamp, North Madison	41 25 00/72 38 00	8
	NH10	Community State Farm, Mt. Carmel	41 25 00/72 54 00	9
	NH12	Farm River, Northford	41 24 00/72 47 00	7
	NH13	West River, Guilford (Rt 77 x Rt 80)	41 21 00/72 42 00	8
	NH14	Yale Trout Stream, New Haven	41 19 00/72 56 00	8
	NH15	From side of house on Molsick Road, Seymour	41 24 00/73 03 00	8

	Site		Lat./Long.	TSA
County	Code	Location	Coordinates	Site Class
New Haven (cont.)	NH16	Quinnipiac River, Cheshire/Meriden, CDEP site 05	41 31 41/72 51 24	5
	NH17	Steele Brook, Waterbury, CDEP site S-8	41 34 10/72 03 30	6
	NH20	Mill Plain Road, Branford	41 18 00/72 46 00	7
	NH21	Nathan s Pond, Madison	41 24 00/72 37 00	8
	NH22	Bluff Head, North Guilford	41 25 00/72 41 00	8
	NH23	Mill River, New Haven	41 17 00/72 56 00	8
New London	NL1	Salmon River, Westchester	41 35 00/72 25 00	7
	NL2	Old Lyme	41 19 00/72 19 00	11
	NL3	Flat Brook, Colchester	41 35 00/72 20 00	6
	NL4	Pease Brook, Lebanon	41 38 00/72 13 00	7
	NL6	Salmon River, Salmon River State Park	41 34 00/72 26 00	6
	NL7	Shetonket River, Occum	41 36 00/72 03-00	7
	NL8	Susquetonsout River, Lebanon	41 38 00/72 12 00	7
	Tolland	TD1	Jeremy River, Hebron	41 39 00/72 21 00
TD2		Fenton River, Willington	41 52 00/72 15 00	6
TD3		Willimantic River, Coventry/Mansfield	41 49 58/72 18 32	2
TD4		Fenton River, Mansfield	41 50 00/72 14 00	6
TD5		Roaring Brook, Staffordville (Stafford)	41 59 00/72 13 00	7
Windam	WM1	Quinebaug River, Killingly, CDEP site 33	41 50 15/71 54 39	4
	WM2	Natchaug River, Chaplin/Eastford	41 50 00/72 05 00	6
	WM3	Quinebaug River, Putnam, CDEP site 32	41 55 13/71 54 33	5
	WM4	French River, Thompson, CDEP site 31	41 57 45/71 53 04	5

††—Site location label did not indicate where along the Housatonic River the specimens were obtained, thus no coordinates could be listed. This site also does not appear on site base map Figure 1.

most species of mayflies in Connecticut are not constrained by ecoregion/sub-region boundaries. The majority of species seem to have an equal chance of occurring where suitable lotic and lentic habitats occur regardless of geographical position. Overlaid on the template of aquatic habitat variables, climate that affects seasonal water temperatures perhaps has the greatest effect in restricting the distribution of some species. Because no stable geographic trends were observed in this data set does not mean there are no regionally predictable patterns. Much of the information on Connecticut species is centered on relatively few sites. Among the 80 sites analyzed, 13 sites contained from 8.33% to 33.33% of the species in Table 1. The remaining sites had from 0.92% to 7.40% of the species recorded. Site specific environmental and land-use variables, shown to be important in discerning ecologic and geographic patterns (Corkum 1989), were not available for most sites. As more sites are sampled and site specific data accumulated, more refined multivariate analyses will be possible. Data compiled in this study provide a starting point for future studies of mayflies in southern New England.

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